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How Game Development Pushes Computer Hardware

In the last 2 decades, video games have figuratively exploded from the collective conceptual mind of all kinds of creative types, interface designers, programmers, artists, and even business executives and project managers. The incredibly large scope of the work of art and simultaneous advanced piece of software that is a modern video game trumps most projects, with so many individual components and content creation pipelines that it would make your head spin. Although the process is highly technical and deliberate, it would not be possible without the even more technical and eccentric software and tools that bring games to life. Among the tools available to the artists and technical artists outside of specific game engines, the game engines themselves are marvels of software engineering that push the limits of computing. Outside of the development team, few people, apart from prospective students and hobbyists, know what goes into making a game, why it is so difficult, and how it impacts the world around them .Game engines have been on the forefront of software and computing technology since before the creation of the screen and mouse, with games like Tetris and Pong, on home entertainment systems. These systems, and the consoles that followed, were the beginning of a generation of hardware that was made specifically to handle video games.

It may not be clear to many, but video games push the known limits of what is possible with computer graphics, audio recording and engineering, computing and algorithms, big data, data visualization, and even psychology. The demand for games that quenched the desire for beauty and challenge, among other aesthetics, led to the development of advanced hardware to

support it. This hardware is now incorporated into the devices everyone uses on a daily basis. The need for faster processors, faster and more powerful graphics cards, and more capable and durable input devices would not be so prevalent if the demand for superior quality in games were not so high. Over time, people became more accustomed to video games and the glorious eye-candy that came with it, and as with other aesthetics of life, it quickly became the norm, and higher quality was soon expected. With each and every release of a new piece of hardware, there was a game or development team that pushed the hardware to its limits, and beyond, with the help of game engines. Game engines are massive software tools designed to emulate and simulate aspects of reality. Many people have seen the Matrix. Not many people realize that collectively, humanity is creating its own version of the Matrix, in the form of the most sophisticated set of tools for game development ever conceived. This trend keeps up with other computing trends such as Moore's law.

Moore's law is the observation that, over the history of computing hardware, the number of transistors in a dense integrated circuit doubles approximately every two years. Although this idea was conceived decades ago, it is still applicable today in a different manner. Simply put, computing power doubles every 2 years, and with each advancement, there is a game engine that will push it to its new theoretical limits. Optimally, a game engine would run on a super-computer, and power a simulation the likes of which have never been seen, an unfathomably huge and accurate portrayal of the world we inhabit, along with every physical law and property it obeys. Game engines require incredibly complex algorithms to reproduce simple aspects of reality, such as common physics. Although to us, watching something fall off of a table and land gently on the floor may seem mundane and simple, in terms of game development, there is a world of complexity within it. Physics algorithms, and a virtual, three-dimensional world are the

bare bones of such an event, and the visualization of the event through the use of a renderer brings even more complexity. Precise mathematical calculations of the positions, dimensions and physical properties of the falling object and an equally accurate simulation of the world around it allows for this behavior to occur in a game. Furthermore, mathematically, the event has occurred, by how is it observed? The event is visualized by even more mathematical calculations, simulating the human eye, or a camera, in a world filled with materials with their own unique physical properties, indulging the observer in a world of shadow, light, color and perspective.

This is really just the tip of the iceberg when it comes to game development. It is complicated enough to envision a system that emulates reality, even for an event as simple as a falling object. Now begin to fathom the sophistication involved in recreating accurately and believably, the motions and behaviors of humans, ourselves. Aside from the literal behaviors produced by our autonomous minds, the task of recreating the natural and seemingly simple movements and actions of the human body is monumental; like Moore's law, the quality of the result heightens over time, both due to the quality of the hardware increasing with it, as well as humanity's perpetual desire to recreate our own existence: "We're on the verge of some very profound changes on what we do and how we perceive technology in general. The gaming industry is very interesting because I look at it as a virtualization of reality. There are things the designers never thought of as part of the experience that begin to be possible." (Vucurevich 1) The technology that we have created, that seemed so foreign mere decades ago, is now a tool for creating the technologies of the future. We have equipped ourselves with the power to create our own world, and our desire to solve the mysteries of universe lays hand in hand with the tools we design.

Works Cited

1. "IBM, AMD, Nvidia, Intel Talk The Future Of Gaming Processors."Gamasutra Article. N.p., n.d. Web. 28 Oct. 2014. http://www.gamasutra.com/php-bin/news_index.php?story=15861